

CESTODES IN THE COLLECTION OF THE INDIAN MUSEUM

BY

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(Received for publication 24 April, 1922)

A. MAMMALS

The parasites described below were obtained, with a few exceptions, from animals which died in the Zoological Gardens, Calcutta.

I do not propose dealing in this paper with the synonymy of the forms recorded.

Family *TAENIIDAE*, Ludwig, 1886

Taenia crassicollis, Rudolphi, 1810

1. One specimen from a cat. Punjab Civil Veterinary College, Lahore, 30.1.14.

2. Three complete specimens from the intestine of *Felis viverrina*. Zoological Gardens, Calcutta, collected by the author, 11.11.14.

3. Another specimen without a head, collected from the same host by the author, 17.2.16.

4. One specimen from the same host. Tollygunge, Calcutta, 9.4.20.

Taenia serrata, Goeze, 1782

1. One specimen from *Felis tigris*. Sukna, Darjeeling district, Bengal, 17.3.17.

2. Two complete and mature specimens from same host, shot at Sevoke, Darjeeling district, Bengal, 3.2.17.

Taenia pisiformis (Bloch, 1780), Gmelin, 1790

One complete specimen from intestine of *Felis leo*. Zoological Gardens, Calcutta, collected by the author, 3.1.16.

Taenia sp.

Eight specimens from the intestine of *Felis pardus*. Zoological Gardens, Calcutta, collected by the author, 19.1.15.

The specimens measured about 1 cm. long and 0.5 mm. broad; they were all immature, no trace of genitalia being visible.

The head was armed with a double row of hooks, the number varying from thirteen to seventeen in each row. The large hooks measured from 135μ to 145μ , and the smaller from 90μ to 100μ .

About fifty segments only were present; the neck measured about 750μ . As the specimens were quite immature, it was impossible to say whether they were new or not.

The following species have been recorded from:—

(1) *Felis concolor*

(a) *T. ammonitifformis*, Baird, 1862, possesses only a single row of hooks.

(b) *T. oligantha*, Diesing, 1863, has only three to four segments.

(2) *Felis pardus*

(a) *T. polycalcaria*, Linstow, 1903, possesses two rows, each row with nineteen hooks, measuring 238μ and 158μ .

(b) *T. serrata*, Goeze, 1782, has two rows each with twenty to twenty-one hooks, which measure 250μ to 260μ and 150μ to 155μ .

It is, of course, quite probable that in the worm in question the hooks would have increased in size as it matured, and that it may be either of the last two species.

Taenia sp.

Fragments comprising a few segments (all sterile) of what appeared to be a *Taenia* sp. were obtained from the intestine of a dog at Lahore. No date.

Taenia sp.

Fragments from the intestine of *Felis tigris*. Zoological Gardens, Calcutta, collected by the author, 22.2.16.

No head was present and no gravid uterus, hence the determination of these fragments was impossible, but superficially they resembled segments of *T. serrata*.

Taenia sp.

One specimen without head from the intestine of *Ursus torquatus* (bear). Zoological Gardens, Calcutta, collected by the author, 21.9.15.

The worm measured about 1 m.; the segments at the anterior end were square and mature. The genital pore was prominent, and, in gravid segments, was situated posterior to the middle of the segment. The worm resembles *T. pisiformis* externally, but the eggs are round and measure 40μ to 45μ ; those of *T. pisiformis* are oval and measure about 37μ by 32μ .

Cysticercus fasciolaris, Rudolphi, 1808

1. *Mus rattus*. Berhampore, Bengal. Collected by Lt.-Col. Clayton Lane and numbered Z.E.V. $\frac{5416}{7}$ in the collection of the Indian Museum. No date.

2. *Mus decumanus*. Collected by Lt.-Col. Alcock and numbered Z.E.V. $\frac{2367}{7}$ in the collection of the Indian Museum. Locality and date not given.

3. Rat. Civil Veterinary College, Lahore. Numbered Z.E.V. $\frac{4672}{7}$ in the collection of the Indian Museum. No date or locality given.

4. Liver of rat. Collected by Dr. D. E. Muir. No date or locality given.

5. *Mus rattus*. Calcutta. Collected by Lt.-Col. Clayton Lane. Numbered Z.E.V. $\frac{927}{7}$ in the collection of the Indian Museum. No date.

Cysticercus cellulosae (Gmelin, 1790), Rudolphi, 1808

One specimen from human brain, Colombo, collected by the author, June, 1911.

Cysticercus tenuicollis, Rudolphi, 1810

Four specimens from the four-horned antelope (*Tetracerus quadricornis*). Zoological Gardens, Calcutta, collected by the author, February, 1914.

Cysticercus sp.

Collected by Capt. Boulenger, 14.12.18. Host and locality unknown.

Family *HYMENOLEPIDIDAE*, Railliet and Henry, 1909

Sub-family (1) *HYMENOLEPIDINAE*, Ransom, 1909

Hymenolepis murina (Duj., 1845), R. Blanchard, 1891

A few specimens from the following sources:—

1. No history. Numbered Z.E.V. $\frac{4689}{7}$ in the collection of the Indian Museum.
2. From a rat. Civil Veterinary College, Lahore, Punjab, no date. Numbered Z.E.V. $\frac{4672}{7}$ in the collection of the Indian Museum.
3. From *Mus decumanus*, collected by Lt.-Col. Alcock, I.M.S., Calcutta. No date. Numbered Z.E.V. $\frac{2367}{7}$ in the collection of the Indian Museum.

Hymenolepis diminuta (Rudolphi, 1819), R. Blanchard, 1891

1. A few specimens from the intestine of a rat, London. Numbered W. $\frac{16}{1}$ in the collection of the Indian Museum.
2. A few specimens from the intestine of *Mus rattus*, Hong Kong, collected by Capt. F. H. Stewart, I.M.S., and numbered W. $\frac{17}{1}$ in the collection of the Indian Museum. No date.

Sub-family (2) *DIPYLIDIINAE*, Stiles, 1896

Dipylidium caninum (Linn., 1758), Railliet, 1892

1. From a cat, Egypt. Numbered Z.E.V. $\frac{2979}{7}$ in the collection of the Indian Museum. No date.
2. From the intestine of a cat, Punjab Civil Veterinary College, Lahore, 30.1.14.
3. From the intestine of a dog. Numbered Z.E.V. $\frac{5595}{7}$ in the collection of the Indian Museum. Locality and date not given.
4. From the intestine of a dog, Lahore. No date. Numbered Z.E.V. $\frac{4675}{7}$ in the collection of the Indian Museum.
5. From the intestine of a dog, Ceylon Medical College, Colombo. Numbered Z.E.V. $\frac{5507}{7}$ in the collection of the Indian Museum. No date.
6. Several specimens. Locality, host, and date not given. Numbered Z.E.V. $\frac{2979}{7}$ in the collection of the Indian Museum.

7. Two specimens from the intestine of *Felis viverrina*. Zoological Gardens, Calcutta, 23.5.19.

8. Three specimens from the intestine of *Hyaena striata*. Zoological Gardens, Calcutta, collected by the author, 17.8.15.

9. Several specimens from *Paradoxurus grayi* (Himalayan palm-civet). Zoological Gardens, Calcutta, collected by the author, 29.3.15.

Dipylidium gervaisi, Setti, 1895

1. One specimen from the intestine of *Felis viverrina*. Zoological Gardens, Calcutta, 30.5.19.

2. Several specimens from the intestine of *Paradoxurus hermaphroditicus* (Malayan palm-civet). Zoological Gardens, Calcutta, collected by the author, 18.5.15.

Family ANOPLOCEPHALIDAE, Fühmann, 1907

Sub-family ANOPLOCEPHALINAE, Blanchard, 1891

Anoplocephala vulgaris, Southwell, 1920

One specimen from *Rhinoceros sondaicus*. No date or locality. Numbered Z.E.V. $\frac{4680}{7}$ in the collection of the Indian Museum.

From a superficial examination of this worm in 1916, I was led to the opinion that it probably belonged to the genus *Thysanosoma*. A more careful examination of the anatomy has, however, left no doubt that it is an *Anoplocephala*, identical with the species *vulgaris*.

Bertiella satyra (R. Blanchard, 1891), Stiles and Hassall, 1902

One specimen without head, from the intestine of *Simia satyrus*. Zoological Gardens, Calcutta, collected by the author, 5.4.16.

Cittotaenia mosaica, Hall, 1908

A few specimens from *Lepus ruficaudatus*, Songara, Gonda district, United Provinces, India. Museum collector (R. Hodgart). Numbered Z.E.V. $\frac{2771}{7}$ in the collection of the Indian Museum. As a result of a preliminary examination, this species was identified as *C. bursaria*, Linstow, 1906. More careful examination of prepared

slides left no room for doubt that they are identical with Hall's specimens.

Moniezia trigonophora, Stiles and Hassall, 1892

1. An immature specimen from the intestine of a black buck (*A. cervicapra*). Zoological Gardens, Calcutta, collected by the author, 30.8.13. Numbered Z.E.V. $\frac{6044}{7}$ in the collection of the Indian Museum.

2. One specimen from the intestine of a four-horned antelope (*Tetracerus quadricornis*). Zoological Gardens, Calcutta, collected by the author, 19.8.19.

Moniezia oblongiceps, Stiles and Hassall, 1893

One specimen from the intestine of a domestic goat, Rangoon, Burma, collected by Dr. A. A. Marshall, 8.8.16.

Moniezia alba (Per., 1879), R. Blanchard, 1891

1. A few specimens from the intestine of *Bos grunniens* (Yak), Tibet, 26.6.16.

2. Other specimens of this species were obtained from sheep, Civil Veterinary College, Lahore, Punjab, 31.1.14.

Moniezia expansa (Rudolphi, 1810), R. Blanchard, 1891

One specimen from the intestine of a domestic goat, Rangoon, *cercus quadricornis*). Zoological Gardens, Calcutta, collected by the author 1.2.13, and numbered Z.E.V. $\frac{6160}{7}$ in the collection of the Indian Museum.

Moniezia neumanni, Moniez, 1891

One specimen from the intestine of a sheep. Civil Veterinary College, Lahore, Punjab, 31.1.14.

Avitellina centripunctata (Riv., 1874), Gough, 1911

Numerous specimens from cattle. Civil Veterinary College, Lahore, Punjab. No date.

Stilesia globipunctata (Riv., 1874), Railliet, 1893

Numerous specimens from sheep. Civil Veterinary College, Lahore, Punjab, 31.1.14.

Family *DIBOTHRIOCEPHALIDAE*, Lühe, 1902

Bothriocephalus maculatus (Leuckart, 1848), Lühe, 1899

Very numerous specimens, all immature, measuring about 10 cms. long and 1.5 mm. broad, from the intestine of *Felis pardus* (black leopard). Zoological Gardens, Calcutta, collected by the author, 31.12.14.

Bothriocephalus sulcatus (Molin, 1858), Linstow, 1878

Two small specimens measuring about 10 cms. long and 3 mm. broad, from the intestine of *Felis pardus*. Zoological Gardens, Calcutta, collected by the author, 5.2.14.

Bothriocephalus decipiens (Diesing, 1850), Lühe, 1899

1. Very numerous specimens (mostly just mature), from the intestine of *Felis tigris*. Zoological Gardens, Calcutta, 23.2.19.

2. Another specimen without head, which appeared to belong to this species, was obtained from the intestine of *Felis pardus*. Zoological Gardens, Calcutta, collected by the author, 10.2.16.

Bothriocephalus sp.

One specimen from a black leopard. Collected by the author, 12.5.13.

The specimen measured 2 cms. long and its greatest breadth was 1.2 mm. As it was quite immature, it is impossible to assign it to any particular species.

Bothriocephalus sp.

From *Paradoxurus grayi* (Himalayan palm-civet). One specimen 10 cms. long and 6 to 7 mm. wide. No head. Zoological Gardens, collected by the author, 19.2.16.

Order *TETRAPHYLLIDEA*, Carus, 1863

Genus *Ophiotaenia*, La Rue, 1911

The systematic position of this genus within the above order is a matter of some uncertainty.

Ophiotaenia punica (Cholodkovski, 1908), La Rue, 1911

Four specimens (one immature), from *Paradoxurus hermaproditicus* (Malayan palm-civet). Zoological Gardens, Calcutta, collected by the author, 18.5.15.

The largest specimen measured about 30 cms. long and 4 mm. broad. The cirrus was spiny; otherwise the worm agreed in detail with the description of this species given by La Rue.

Cholodkovski obtained the parasite from a dog in Tunis (1908); Hall, Ransom and La Rue were all of opinion that the normal host is a snake, and that the presence of the worm in a dog was to be accounted for by the dog having eaten a snake. On this hypothesis we have to assume that the Malayan palm-civet must likewise have eaten a snake which harboured the adult worm, but its presence in both a dog and a cat, each from different localities, is of note.

Cestoda sp.

About ten segments of a worm from the intestine of *Loris gracilis*. Zoological Gardens, Calcutta, collected by the author, 29.7.16. They measure about 2 mm. wide and are much broader than long. The genital pores are irregularly alternate. The ovary is central, anterior and fan-shaped, the testes being posterior and extending across the segment. The cirrus is unarmed. Eggs round and measuring 35μ , not in capsules; they have double coverings and contain a hexacanth embryo. Pyriform apparatus absent. Owing to lack of material and the absence of a head, it is impossible to say with certainty to which genus the specimens belong.

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B. PIGEONS

Moniczia columbac, Führmann, 1902
= *Paronia carrinoi*, Diamare, *ex parte*

One specimen, without head, consisting of ripe, but not gravid, segments, from a pigeon (sp. ?), Berhampur, Bengal, India, 29.4.11.

Davainca spiralis, Baczynska, 1914

1. One specimen from a common pigeon (*Columba* sp.). Zoological Gardens, Calcutta, India, 25.4.19.

The uterus was not developed, but the prostatic glands were well defined. The specimen was mounted.

2. Two complete specimens, two large worms without heads and ten fragments were obtained from the intestine of *Crocopus phoenicopterus*. Zoological Gardens, Calcutta, India, collected by the author, 28.1.16.

Our specimens agreed with Baczynska's description, except in the matter of length. Whilst the types measured only 3 to 4 cms. long, our specimens measured 15 cms. long, the posterior 12 cms. being composed of gravid segments only.

3. About eight specimens of this species from intestine of a common pigeon, *Columba* sp. Zoological Gardens, Calcutta, 11.12.20.

In these specimens the number of testes varied between twelve and twenty, the greater number being invariably situated on one side.

Davainca anatina, Führmann, 1908

1. Four specimens from a pigeon (*Columba* sp.). Chilka Lake, Orissa, collected by the author. No date.

This species has hitherto only been recorded from *Anas boschas* dom.

2. An immature worm with a head and a few fragments, probably of this species, obtained from *Crocopus phoenicopterus* (green pigeon). Chilka Lake, Orissa, India (Chilka Survey), 22.11.14.

Davainca ceylonica, Bacz, 1914

1. Several fragments, without head, from *Crocopus phoenicopterus*. Zoological Gardens, Calcutta, India, collected by the author, 8.1.14.
2. Several worms, without heads, from *Columba leuconata*, Vig. (white-bellied pigeon). Zoological Gardens, Calcutta, India, collected by the author, 1.5.15.
3. One specimen from *Crocopus phoenicopterus*. Chilka Lake, Orissa, India (Chilka Survey), 22.11.14.

DAVAINEA FÜHRMANNI, n. sp.

1. Several complete specimens from *Crocopus phoenicopterus* (green pigeon). Zoological Gardens, Calcutta, Bengal, India, collected by the author, 26.1.14.
2. Numerous complete specimens from same host. Zoological Gardens, Calcutta, collected by the author, 22.7.15.
3. About nine specimens from same host. Zoological Gardens, Calcutta, India, collected by the author, 10.1.17.
4. About ten specimens of this worm were obtained from same host. Zoological Gardens, Calcutta. No date.
5. About twelve specimens and a large number of fragments from *Crocopus phayrai* (green pigeon). Zoological Gardens, Calcutta, India, collected by the author, 1.1.18.

EXTERNAL ANATOMY

The largest specimen was about 80 mm. long and 0.7 mm. broad. The worms exhibited very considerable variations; in young segments the pore was situated at the extreme anterior margin, whilst in mature and gravid segments it was slightly in front of the middle.

The segments varied in shape; in some worms they were all broader than long, except the last few, which were square; in other specimens the segments were somewhat bell-shaped, whilst in still other worms the terminal segments were twice as long as broad.

The longest posterior segment measured 1.2 mm. long and 0.7 mm. broad. The genital pores are unilateral.

Head. The average size of the head was about 250μ broad and 330μ long. The large rostellum, which was about 100μ long and 150μ broad, is armed with a double row of about one hundred and ten hammer-shaped hooks (fig. 2), measuring from 25μ to 30μ , the



FIG. 1. *Davainea fubrmanni*, n.sp.
Showing head and neck. $\times 70$.



FIG. 2. *Davainea fubrmanni*, n.sp.
Hook from the rostellum. $\times 1,125$.

hooks in the anterior row being slightly larger than those in the posterior row. The suckers have a diameter of about 70μ and are armed with several rows of minute hooks (fig. 1). In six of our specimens no trace of hooks was to be found on the suckers; they had apparently fallen off.

Neck. The neck varied in length from 0.3 mm. to 1.4 mm.

Nervous system. There is a single nerve situated lateral to the ventral water vessel and ventral to the cirrus pouch.

Muscular system. The longitudinal muscles are well-developed; the bundles are arranged in a single layer, the external being smaller in every way than the internal bundles; the arrangement is best seen in young adults. The circular fibres consist of a very narrow layer lying immediately internal to the longitudinal fibres. Oblique fibres were very scanty.

Water vascular system. A single ventral vessel runs along each lateral margin; that on the pore side lies ventral to the cirrus pouch and is situated further from the lateral margin than is the aporal vessel. This asymmetry is not, however, always pronounced.

INTERNAL ANATOMY

Male genitalia. Testes. The testes lie dorsal, and are about twelve in number; seven or eight lie on the aporal side of the ovary, one or two lie posterior and lateral to the yolk gland, and the rest—usually three—lie on the pore side of the ovary. They do not extend beyond the water vessels (figs. 3 and 4).

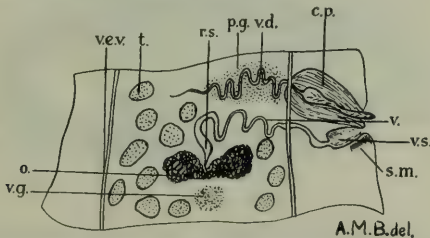


FIG. 3. *Davainea fubrmanni*, n.sp. Segment showing male and female genitalia. c.p.—cirrus pouch; o.—ovary; p.g.—prostatic gland; r.s.—receptaculum seminis; s.m.—sphincter muscle; t.—testes; v.—vagina; v.d.—vas deferens; v.s.—vaginal sinus; v.e.v.—ventral excretory vessel; v.g.—vitelline gland. $\times 140$.

Vas deferens. The vas deferens is a long, loosely coiled, slightly dilated tube, extending quite half way across the segment and surrounded throughout its length by a dense mass of glandular tissue—the prostate gland; it reaches its full development somewhat late. As no seminal vesicle was observed, it would appear that the elongated vas deferens functions as a seminal vesicle. The cirrus pouch is large, measuring in mature segments about 170μ long and 80μ broad: it lies across the antero-lateral angle of the segment and extends just internal to the lateral water vessel. The cirrus is armed with large spinules, measuring about 17μ ; these, however, cannot always be seen (figs. 3 and 4).

Female genitalia. Ovary. The ovary is bi-lobed, each lobe having a rounded appearance. It lies slightly behind the centre of the segment (figs. 3 and 4).

Receptaculum and vagina. The vagina is a long, muscular, sinuous tube; the terminal portion lying posterior to the whole length of the cirrus pouch is often, but not always, dilated. Its extreme lateral extremity lies at the base of a well pronounced sinus, situated immediately posterior to the cirrus pouch; a well developed sphincter muscle surrounds the opening of the vaginal sinus. Slightly anterior to the ovary the vagina dilates into a small but somewhat elongated receptaculum (figs. 3 and 4).

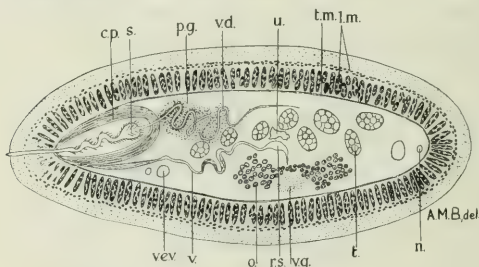


FIG. 4. *Davainea subramani*, n.sp. Transverse section showing male and female genitalia, etc. *cp.*—cirrus pouch; *l.m.*—longitudinal muscle; *n.*—nerve; *o.*—ovary; *pg.*—prostatic gland; *r.s.*—receptaculum seminis; *s.*—spines on cirrus; *t.*—testes; *t.m.*—transverse muscle; *u.*—uterus; *v.*—vagina; *vd.*—vas deferens; *v.e.v.*—ventral excretory vessel; *vg.*—vitelline gland. \times about 160.

Vitelline glands. This lies posterior to the ovary, and is easily seen. In size it is almost equal to one wing of the ovary (figs. 3 and 4).

Uterus. The uterus is first visible as a small, irregular cavity, situated immediately anterior to the vitelline gland. It enlarges rapidly, eventually filling the entire segment between the water vessels. The eggs, when first seen, appear as a dense granular mass filling the uterus. A few segments further back about forty capsules are differentiated, each containing six or seven, and rarely nine to eleven, oncospheres. At first the mature uterus lies strictly within the water vessels, but in the last five or six segments, the water vessels disappear and the entire segment is occupied by the capsules

(figs. 5 and 6). Black pigment occurs abundantly in the posterior two-thirds of the worm.

Eggs. These measure about 36μ .

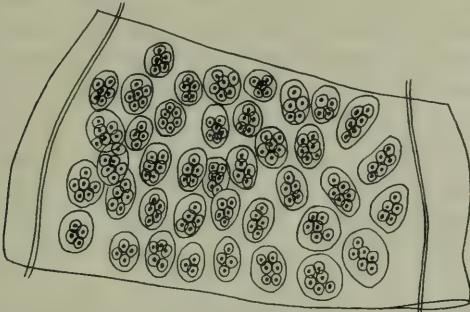


FIG. 5. *Davainea fübmanni*, n.sp. Gravid segment showing eggs in capsules. $\times 120$.

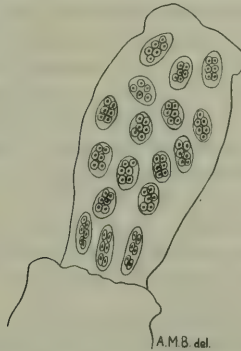


FIG. 6. *Davainea fübmanni*, n.sp. Gravid segment showing eggs in capsules. $\times 60$.

DIAGNOSIS

The species noted below have been recorded from *Columbiform* birds, and the table shows the principal points in which they differ from *D. fübmanni*.

	Length	Breadth	No. of hooks	Size of hooks	Pores	No. of testes	No. of eggs per capsule
	mm.	mm.					
<i>D. goura</i>	170	1.1	300	9 μ	unilat.	18-20	8-10
<i>D. cryptacantha</i>	120	1.5	170	7 μ	"	8-12	several
<i>D. spiralis</i>	30-40	1.3	300	15.6 μ	"	4-5	4-6
<i>D. paucitesticulata</i>	100	0.6	120	9-10 μ	"	6-7	7-8
<i>D. insignis</i>	300	?	?	?	"	?	?
<i>D. micracantha</i>	100	0.8	160-200	13-14 μ	"	12-16	4-5
<i>D. columbae</i>	70	1.0	120	11 μ	irreg.	30	1
<i>D. crassula</i> , Führ.	250-400	4.0	70	20 μ	"	30-40	3-4
" Clerc.	?	?	400	10 μ	?	?	?
" Stiles	?	?	70	10 μ	?	?	?
<i>D. führmanni</i> , n.sp.	80	0.7	110	25-30 μ	unilat.	About 12	6-7

I have been unable to obtain a description of *D. insignis* (Steud), but, according to Meggitt, it has armed suckers. The only species of *Davainea* possessing hooks about 28 μ long are *D. mutabilis*, *D. campanulata*, *D. undulata* and *D. vaganda*. In the first two the pores are alternate and the suckers unarmed: *D. vaganda*, Baylis, has only six to eight testes. Führmann informs me that his species *D. undulata* is different from *D. führmanni*, n. sp.

Our worm bears a general resemblance to *D. allomyodes*, Kotlán, 1921, especially in the following particulars:—

1. Size.
2. Unilateral pores.
3. The cirrus pouch and armed cirrus.
4. The vaginal sinus and sphincter.
5. Number of testes.
6. Number of eggs in each capsule.

It differs from *D. allomyodes* in the following respects:—

1. Size and number of hooks (one hundred and sixty to two hundred in *D. allomyodes*, measuring 17 μ to 18 μ).
2. No mention is made in the description of *D. allomyodes* of the very long, loosely coiled vas deferens.
3. Number of capsules per segment, viz., sixteen in *D. allomyodes* and at least forty in *D. führmanni*, n. sp.

Some variations in the number of capsules in each segment is to be expected, but in this case the difference is considerable.

Our species is, however, much more closely related to *D. ceylonica*, Bacz., 1914, obtained from *Pavo cristatus* in Ceylon, the very long vas deferens being thrown into loops in both species. They appear to differ, however, in the following characters:—

	Length	Breadth	Size of hooks	Spines on cirrus	Ovary	Vaginal sinus
<i>D. führungmanni</i>	mm. 80	mm. 0·6-0·7	25-30 μ	Present	Bi-lobed	Present
<i>D. ceylonica</i>	30-40	1·3	10 μ	Not described	Fan-shaped	Not described

It will be clear that the principal difference lies in the size of the hooks, which, being hard, do not alter in size as the soft structures are liable to do.

The notable characters of *D. führungmanni*, n. sp., are as follows:—

1. Large hooks on the rostellum 25 μ to 30 μ .
2. Suckers armed.
3. Long neck.
4. Pores unilateral.
5. Few testes (about twelve).
6. The large cirrus pouch.
7. Large spines on cirrus (measuring 17 μ).
8. The very long, loosely coiled, vas deferens.
9. The large prostate gland.
10. The vaginal sinus with sphincter muscle.
11. Six or seven eggs per capsule.

I have great pleasure in naming this species in honour of Professor O. Führungmann, of the Zoological Department, University of Neuchâtel, who has contributed so much to the science of Helminthology.

Davainea sp.

A fragment, without head, from a pigeon (*Columba* sp). Berhampur, Bengal, India, 1912.

Davainea sp. (? *paradisea*, Führ., 1908)

A head and a few anterior segments, from a pigeon (sp. ?). Zoological Gardens, Calcutta, collected by the author, 1.2.14.

The hooks measured about 23μ , and were in a double row. The only species with hooks 23μ long are *D. paradisea*, Führ., and *D. conopophilea*, Johnstone. The specimen was mounted.

Davainea sp.

One specimen, from the common pigeon (*Columba* sp.). Zoological Gardens, Calcutta, collected by the author, 11.12.13.

The worm measured 15 cms. long and 3 mm. broad; head absent. The egg capsules extend beyond the water vessels, and each capsule contains three or four oncospheres.

Hymenolepis gracilis, Cohn, 1901

Two specimens, complete, from *Crocopus phoenicopterus*. Chilka Lake, Orissa, India (Chilka Survey), 22.11.14. Not previously recorded from this host.

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C. DUCKS

Hymenolepis sp. (*sinuosa* ?, Zed., 1800), Cohn, 1901

= *T. bairdii* (Krefft, 1871)

= *H. collaris* (Batsch, 1786)

Seven specimens from intestine of *Anas poecilorhyncha*. Zoological Gardens, Calcutta, collected by the author, 6.2.15.

The worms measured 6 to 8 cms. long and the greatest breadth was 2 mm. None of the specimens possessed a head. The posterior segments were as long as broad, and some of the anterior segments were bell-shaped and much longer than broad.

The three testes were lobed. Two were situated on the aporal side, one being directly anterior to the other. The third testis was on the pore side. The ovary was situated between the testis on the pore side and the anterior aporal testis. The accessory sac was well defined.

In the absence of a head, it is impossible to say with certainty to which species our specimens belong, but they bear a very close resemblance to *H. sinuosa* (Zed.).

Drepanidotaenia gracilis (Zed. 1803), Railliet, 1893

Six specimens from a tufted duck (*Fuligula cristata*). Loktak Lake, Manipur, Assam, Station 15, February 22nd, 1920. Manipur Survey, Zoological Survey of India. Recorded for the first time from this host.

Drepanidotaenia fasciata (Rud., 1810), Railliet, 1893

Duck. Intestine. No date or other details. Madras, collected by the author.

Fimbriaria malleus (Goeze, 1782), Froel, 1802

One specimen from a tufted duck (*Fuligula cristata*). Loktak Lake, Manipur, Assam, Station 15, February 22nd, 1920. Manipur Survey, Zoological Survey of India. Recorded for the first time from this host.

Cotugnia (?) *bifaria* (Sieb., 1848), Stiles, 1896

One specimen, 80 mm. long and without head; from a duck (species ?). Zoological Gardens, Calcutta, collected by the author, 4.3.14.

Diploposthe laevis (Bloch, 1782), Jacobi, 1896

1. Three specimens without heads. Collected by the author from *Nyroca fuligula* (the tufted duck); Zoological Gardens, Calcutta, 28.1.16.

The worms measured about 80 mm. long and 5 mm. broad.

2. One complete specimen from *Nyroca baeri* (eastern white-eyed duck). Zoological Gardens, Calcutta, 11.4.11.

The specimen measured about 85 mm. long and 6 mm. broad. Recorded for the first time from this host.

D. CROWS

Genus *Davainea*, Blanchard and Railliet, 1891

Davainea corvina, Fühmann, 1905

= *D. polycalcaria*, Linstow, 1906

(a) From *Corvus macrorhynchus*

1. Two specimens. Calcutta, India, collected by the author, September, 1912.

2. Two specimens, without heads. Calcutta, India, collected by the author, no date, and numbered Z.E.V. $\frac{6873}{7}$ in the collection of the Indian Museum.

3. Two specimens. Calcutta, India, July 18th, 1911. Numbered Z.E.V. $\frac{5359}{7}$ in the collection of the Indian Museum.

4. Seven specimens. Calcutta, India, collected by the author, 29.9.12.

5. Numerous specimens. Sabour, Bihar, India, collected by the author, 21.10.13.

(b) From *Corvus macrorhynchus* and *Corvus splendens*

6. Numerous specimens. Calcutta, India, collected by the author and numbered Z.E.V. $\frac{6146}{7}$ in the collection of the Indian Museum.

(c) From *Corvus* sp.

7. Five very large specimens. Khulna, Bengal, collected by the author, 1912.

8. Numerous large specimens. Chilka Lake, Orissa, India, collected by the author, 4.8.13., and numbered Z.E.V. $\frac{6146}{7}$ in the collection of the Indian Museum.

Genus *Hymenolepis*, Weinland, 1858

Hymenolepis dahurica (Linstow, 1903), Führmann, 1906

Three specimens. Calcutta, India, collected by the author and numbered Z.E.V. $\frac{6164}{7}$ in the collection of the Indian Museum. No date.

Cotugnia margareta, Beddard, 1916

One specimen. Calcutta, India, collected by the author, 1913. Both the preceding species were from *Corvus macrorhynchus*.

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E. BIRDS (MISCELLANEOUS)

Davainea urogalli (Modeer), 1790

= *Taenia urogalli*, Modeer, 1790

= *Taenia calva*, Baird, 1853

= *Davainea calvi*, Shipley, 1906

Many specimens (only one with a head) from *Caccabis chucar* (Partridge). Zoological Gardens, Calcutta, India, collected by the author, 18.2.18.

Cittotaenia avicola, Führmann, 1897

One specimen, probably of this species, from the intestine of a moonal pheasant (*Lophophorus refulgens*). Zoological Gardens, Calcutta, India, collected by the author, 6.6.17.

The worm was complete, but in a bad state of preservation; the latter circumstance being due to the fact that the host had been dead over a day when the post-mortem was made. As a result, it was impossible to make out the anatomy with precision. The worm measured 16 cms. long, and many of the posterior segments were longer than broad; the largest measured 3.6 mm. long and 2.8 mm. broad. The head measured from 0.75 mm. to 1 mm. broad.

Anomotaenia acollum, Führmann, 1907

Two specimens from intestine of *Cuculus varius*. Zoological Gardens, Calcutta, India, collected by the author, 20.1.14.

Bertia delafondi (Railliet, 1882), Führmann, 1901

= *T. delafondi*, Railliet, 1882

= *T. sphenoccephala* (Megnin, Linstow), *ex parte*

A fragment (mounted) from intestine of *Platycercus pennanti*. Zoological Gardens, Calcutta, India, collected by the author, 25.6.15.

Hymenolepis fusus (Krabbe, 1869), Führmann, 1906

Numerous complete specimens from the intestine of a gull (*Larus brunneiceps*). Zoological Gardens, Calcutta, India, collected by the author, 30.11.15.

The hooks measured 16μ and were of the shape typical in this species. The neck was long; of the three testes, two were situated on the pore side, one anterior and slightly lateral to the other.

Dilepis macrosphincter, Führmann, 1909

One complete specimen from the intestine of *Ardea purpurea*. Zoological Gardens, Calcutta, India, collected by the author, 20.9.15.

The specimen measured 10 cms. long and the greatest breadth was 1.7 mm. The genital pores are unilateral; the head bore sixteen to eighteen hooks measuring 54μ .

Hymenolepis liguloides (Gerv., 1847), Cohn, 1901

= *Amabilia lamelligera*, Linst., 1879

= *T. caroli*, Paroni, 1887

Two specimens from the intestine of *Phoenicopterus roseus* (flamingo). Zoological Gardens, Calcutta, India, 19.5.19.

Drepanidotaenia megalorchis (Lühe, 1898)

Several specimens from intestine of *Phoenicopterus roseus* (flamingo). Zoological Gardens, Calcutta, India, collected by the author, 16.1.13.

Hymenolepis ? *breviannulata*, Führmann, 1906

Fragments and one head, probably of this species, from intestine of little cormorant (*Phalacrocorax carbo*). Chilka Lake, Orissa, India. Chilka Survey. No date. Numbered Z.E.V. $\frac{6815}{7}$ in the collection of the Indian Museum.

Davainea cohni, Bacz., 1914.

1. Several specimens from *Pterocles exustus*, Temm., 1825. Zoological Gardens, Calcutta, India, collected by the author, 29.1.15.

2. Six specimens, without heads, the largest measuring 16 cms. long and 1.2 mm. broad, from the intestine of *Pterocles arenarius*. Zoological Gardens, Calcutta, India, collected by the author, 24.11.16.

Choanotaenia (? *ungulifera*)

Several specimens, without heads, from *Totanus hypoleucus* (common sand-piper). Barkuda Island, Chilka Lake. No date.

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F. REPTILES

Family *BOTHRIOCEPHALIDAE*, Cobb., 1864Sub-family *DIBOTHRIOCEPHALINAE*, Lühe, 1899Genus *Bothridium*, Blainville, 1824*Bothridium pithonis*, Blainville, 1828

1. Four specimens from *Python molurus*, collected by Lt.-Col. Clayton Lane, I.M.S., Darjeeling, Bengal India, 15.3.14.

2. One specimen from *Python reticulata*. Zoological Gardens, Calcutta, India, collected by the author, 26.1.18.

3. Several large specimens from intestine of *Python molurus*. Zoological Gardens, Calcutta, India, 3.7.19.

4. Several large specimens from *Python molurus*, collected by Lt.-Col. Clayton Lane, I.M.S., Berhampur, Bengal, India, May, 1913.

5. Seven very large specimens from *Python reticulata*, collected by Lt.-Col. Clayton Lane, I.M.S., Darjeeling, Bengal, India, 1917. ?

6. Two very large specimens from *Python* sp. Darjeeling, Bengal, India, 1916.

Genus *Duthiersia*, Perrier, 1873*Duthiersia fimbriata* (Diesing, 1850), Mont. and Crety, 1891

1. Several specimens from *Varanus salvator*. Outskirts of Calcutta, India. Purchased. No date.

2. Several specimens. Numbered Z.E.V. $\frac{5364-65}{7}$ and Z.E.V. $\frac{5451}{7}$, from *Varanus salvator*. Zoological Gardens, Calcutta, India, collected by the author, 1914.

3. Four specimens from *Varanus salvator*. Zoological Gardens, Calcutta, India, collected by Dr. Baini Prasad, December, 1920.

4. Two specimens from *Varanus flavescens*. Zoological Gardens, Calcutta, India, collected by the author, 21.6.16.

5. A few badly preserved fragments from *Varanus flavescens*. Zoological Gardens, Calcutta, India, collected by the author, 18.7.15.

6. One specimen and a few fragments from *Varanus* sp.

Berhampur, Bengal, India, collected by Lt.-Col. Clayton Lane, I.M.S. Numbered Z.E.V. $\frac{5508}{7}$ in the collection of the Indian Museum.

7. Five specimens from *Varanus nebulosus*. Zoological Gardens, Calcutta, India, 21.3.19

8. Several specimens from lungs, mesenteries and stomach of *Varanus salvator*. Zoological Gardens, Calcutta, India, collected by the author, 7.2.13.

9. About twelve specimens from *Varanus salvator*. Zoological Gardens, Calcutta, India, collected by the author, 19.4.13.

10. Two large and complete specimens from *Varanus nebulosus*, collected by E. Vredenburg, Esq., Geological Survey of India, 3.7.16.

11. Two small specimens from intestine of *Varanus salvator*. Zoological Gardens, Calcutta, India, collected by the author, 26.3.15.

Family *PROTEOCEPHALALIDAE*, La Rue, 1914

Genus *Acanthotaenia*, Linstow, 1903

Acanthotaenia biroi (Ratz, 1900)

= *Ichthyotaenia biroi*, Ratz, 1900

Numerous specimens from *V. bengalensis*, killed on the shores of the Chilka Lake, Orissa, India, collected by the author, 6.8.13. and numbered Z.E.V. $\frac{6045}{7}$ in the collection of the Indian Museum.

The variations observed in our specimens of this species leave little doubt that it is identical with *A. tidswelli*, Johnston, separated by Johnston on account of the position of the genital pore and the shape of the cirrus pouch. A casual observation led, in the first instance, to the identification of this specimen as *I. nilotica*, Beddard, but it differs from *I. nilotica* in having only about forty-five testes, etc., whilst it agrees in all details with *I. biroi*.

Genus *Ophiotaenia*, La Rue, 1911

Ophiotaenia sp. (*calmetti*, Barrois ?)

Two fragments, measuring about 15 mm. long and 4 mm. broad; immature. No head present. From intestine of *Bungarus coeruleus*. Zoological Gardens, Calcutta, India, collected by the author, 7.2.18.

Genus *Ophidotaenia*, Beddard, 1913*Ophidotaenia naiae*, Beddard, 1913

One young but complete specimen from *Naia tripudians*.
Zoological Gardens, Calcutta, India, 15.1.21.

The genitalia were fully developed, but the uterus, which consisted of a central stem running antero-posteriorly, was very young and not gravid. The uterine pores, described by Beddard, were therefore not developed, but in every other respect the worm agreed with Beddard's description.

Genus *Linstowia*, Zsch., 1899*Linstowia* sp.

Two specimens without heads; from *Hemidactylus flaviviridis*, killed in the grounds of the Indian Museum, Calcutta, India, collected by Dr. Baini Prashad. No date.

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G. AMPHIBIANS

Nematotaenia dispar, Lühe, 1899

1. A few fragments from a toad (*Bufo* sp.), collected by Captain Stewart, I.M.S., 5.2.14.

2. One complete specimen and several fragments from intestine of *Bufo melanostictus*, collected by Captain R. B. Seymour Sewell, I.M.S.